

in any consumer legislation. Support for the Decoder Interface Connector was included in this definition. The NCTA Board supported the Decoder Interface Connector during its January 13, 1992 meeting.

V. A "CABLE READY" TECHNICAL STANDARD

The terms "cable ready" and "cable compatible" are frequently applied to TV receivers and VCRs. Major cable subscriber frustrations are due to this terminology being used too loosely by the consumer electronics industry. Purchasers of these products are often led to believe that these products can be directly connected to the cable system without loss of functionality of either the cable service or the features included in the TV or VCR. This is generally not the case. There frequently are technical deficiencies in these products which impair performance when they are directly connected to the cable. Consumer electronics manufacturers should not unilaterally declare their products to be cable ready without the consent and concurrence of the cable system for which they are supposedly ready. This is only logical and fair. The consumer electronics industry shouldn't be allowed to call products cable ready which don't work properly when directly connected to the local cable system.

A. The Standard

The concept of cable ready is really very straight forward. If a product is truly cable ready it can be connected directly to the cable system and:

- (a) neither interfere with the reception of others nor be susceptible to ingress of unwanted signals, such as DPU;
- (b) provide all the services the subscriber has paid for without the need of additional hardware installed between the output of the descrambler or decompressor supplied by the cable system and the product;
- (c) comply with all the FCC rules concerning cable radiation and cable technical standards; and
- (d) implement features in a way that remain substantially usable when the product is connected to cable.

The goal is simple: to minimize consumer confusion, frustration, and waste. For a consumer electronics product to be truly "cable ready," the Commission should establish a number of basic technical requirements:

- (1) Tuner Range: The TV or VCR must conveniently tune all channels offered on the cable system. Otherwise an auxiliary converter is required for access to channels the subscriber has paid for.
- (2) Tuner Quality: The tuner must be of sufficient quality to function with all the channels simultaneously available at its input terminals without introducing distortions or noticeable noise. The tuners used in cable converters are generally of higher quality than those used in TV receivers or VCRs in order to accommodate these needs.
 - (a) If the tuner is not of adequate quality, it will combine signals from several channels in a manner that produces disturbing moving background bars and patterns in the picture. This problem is called "overload."
 - (b) Cable converters use a more expensive "double conversion" tuner which eliminates "image response." Without this added expense, an unwanted channel's signal may be mixed with the desired channel, distorting the picture.
 - (c) The tuning system must have adequate adjacent channel rejection to avoid energy from adjacent

channels contaminating the picture or sound of the desired channel.

- (d) Cable converter tuners typically have a lower "noise figure" which introduces less "snow" into the picture than a TV or VCR tuner.
 - (e) The tuner must not feed back extraneous interfering signals into the cable system to cause reception problems on other receivers.
- (3) Direct Pick Up Interference: The internal circuits of the TV or VCR must be adequately shielded so as not to pick up signals off-air directly. When this shielding is inadequate, signals directly picked up off-air are mixed inside the TV (or VCR) with signals from the cable producing an unpleasant (and sometimes unwatchable) mess. In many of these cases, the only solution is to add a set-top converter with its superior (and more expensive) shielding. The problem will become more acute as cable bandwidth expands to higher frequencies. It is more difficult to shield against UHF broadcast channels. In addition, other signals, such as from pagers or two way radios cause serious problems. This shielding requirement must apply to all cables, switches, splitters, and other devices supplied with TVs and VCRs as well as any other devices meant to be connected to cable.
- (4) EIA/ANSI 563: If the cable system uses scrambled signals, the TV or VCR must accommodate a descrambler which can be plugged into the rear of the TV or VCR to allow descrambling after the TV or VCR's tuner and remote controls. Without the Decoder Interface Connector plug, an integrated converter/descrambler is required to give access to scrambled signals desired by the subscriber. As explained in detail in the previous

force-tune it to the correct channel at the appropriate time. Otherwise a set-top box is required to enjoy IPPV services.

- (6) Back Feed: There are many sources of interfering signals within a TV or VCR. These include the tuner's local oscillator and the color oscillator. Modern TVs and VCRs with digital signals generate substantial quantities of interfering signals. The expanded use of On Screen Displays increases this problem. These signals must not "back feed" into the cable system to interfere with other TVs and VCRs.
- (7) Signal Splitters: If the TV or VCR employs signal splitters, they must be of sufficient bandwidth to split the entire spectrum. These splitters should split the signal evenly. In the ideal case, a wide-band, low noise amplifier is provided so that signal strength is maintained at all outputs of the splitter.
- (8) Switch Isolation: When source selection switches are used, they must have adequate isolation over the entire frequency band so cable signals cannot leak to other devices such as roof top antennas. Without adequate isolation, there exists the potential for signal "back feed" to radiate from a subscriber's external antenna creating potential to exceed CLI standards, pose a threat to air navigation and communications, and interfere with other off-air communications reception.
- (9) Replaceable Tuner: The TV or VCR tuner should be replaceable so that the subscriber may continue to use his product if technology makes it possible to carry more channels on cable than his existing tuner can access. A replacement of the tuner module will prevent the need to purchase a whole new unit. One possible method of accomplishing this is with a tuner module compatible with the EIA 563 Decoder Interface Connector and including such a connector itself. This tuner module could then be placed conveniently out of sight. The remote control signals would pass through the TV or VCR to it and control it just as they had controlled the old tuner. A descrambler plugged into the tuner module's EIA 563 connector provides descrambling as needed.
- (10) Antenna Access: A separate antenna connector should be required. If the TV or VCR is remote controlled, a button would be provided for cable/antenna access. In the "Antenna" mode, the tuner tunes broadcast channels

standard cable channels. This may be determined by another control or may be automatic. This antenna connector allows subscriber access to broadcasters who decline to give retransmission consent. Moreover, even in cases where a subscriber does not need or desire a source selection switch for off-air reception purposes, such a switch could be used to facilitate access to competitive multichannel video programming distributors such as video dialtone, DBS, a second cable system, etc.

It will be appreciated that "cable ready" is a situational definition. For example, in the new 150 channel system in Queens, New York, no existing TV or VCR can satisfy the definition of "cable ready" since none can tune the 1 GHz spectrum containing 150 cable channels. For subscribers to be able to enjoy all the signals they have paid for, a set-top converter must be supplied by the cable operator. As another example, the same TV receiver which gave acceptable performance in a suburb far away from any broadcast television transmission towers may require a set-top converter to reject these signals if the subscriber moves near a broadcast tower. If the TV receiver's internal shielding is inadequate, direct pick up interference may be experienced which spoils the picture reception. The only solution available to the cable operator is to install a set-top converter with superior internal shielding.

Another source of confusion generated on the TV sales floor is the specification of the number of "cable ready" channels. The number is given as the sum of the broadcast VHF (12) plus UHF (69) plus cable channels which can be tuned. A purchaser who is told that the TV will tune 117 channels can be forgiven for being

impressed and thinking that it is adequate. Yet, this set is likely to only accommodate the 36 channels of a 300 MHz cable system. More and more, this is inadequate. Under this counting scheme, a "cable ready" TV for use in the Queens New York 150 channel system needs $12+69+150 = 231$ channels! A standard method of specifying channel capacity of products and cable systems is required. TVs and VCRs should be specified as "cable ready for XXX channel cable systems."

It is not well recognized that the invention of the cable converter originally was not for the purpose of tuning more channels. The first converters did not tune more than twelve channels. The cable converter was invented to overcome deficiencies in TV receiver tuners. They were meant first to combat the direct pick up problem described above. Then, as more channels were added to cable service, the cable converter took on added technical burdens. The cable converter was required to counter the effects of non-linear performance and "image response" of less expensive tuners. Improved noise performance and protection from "back feed" are reasons for improved tuners in converters supplied by cable operators.

B. Potential for Evasion

All TVs and VCRs which tune cable channels must comply with all of the technical specifications in order to be truly "cable ready." If a TV or VCR does not comply with the technical definition of cable ready, it must only be allowed to tune the broadcast channels. Otherwise, consumer confusion and

frustration is inevitable. To allow products to be sold which tune cable channels but do not comply with the technical definition of cable ready is to provide an opportunity for evasion of the intent of Congress. Merely not using the term cable ready should not be an escape mechanism for producing products which do not perform properly when connected to cable.

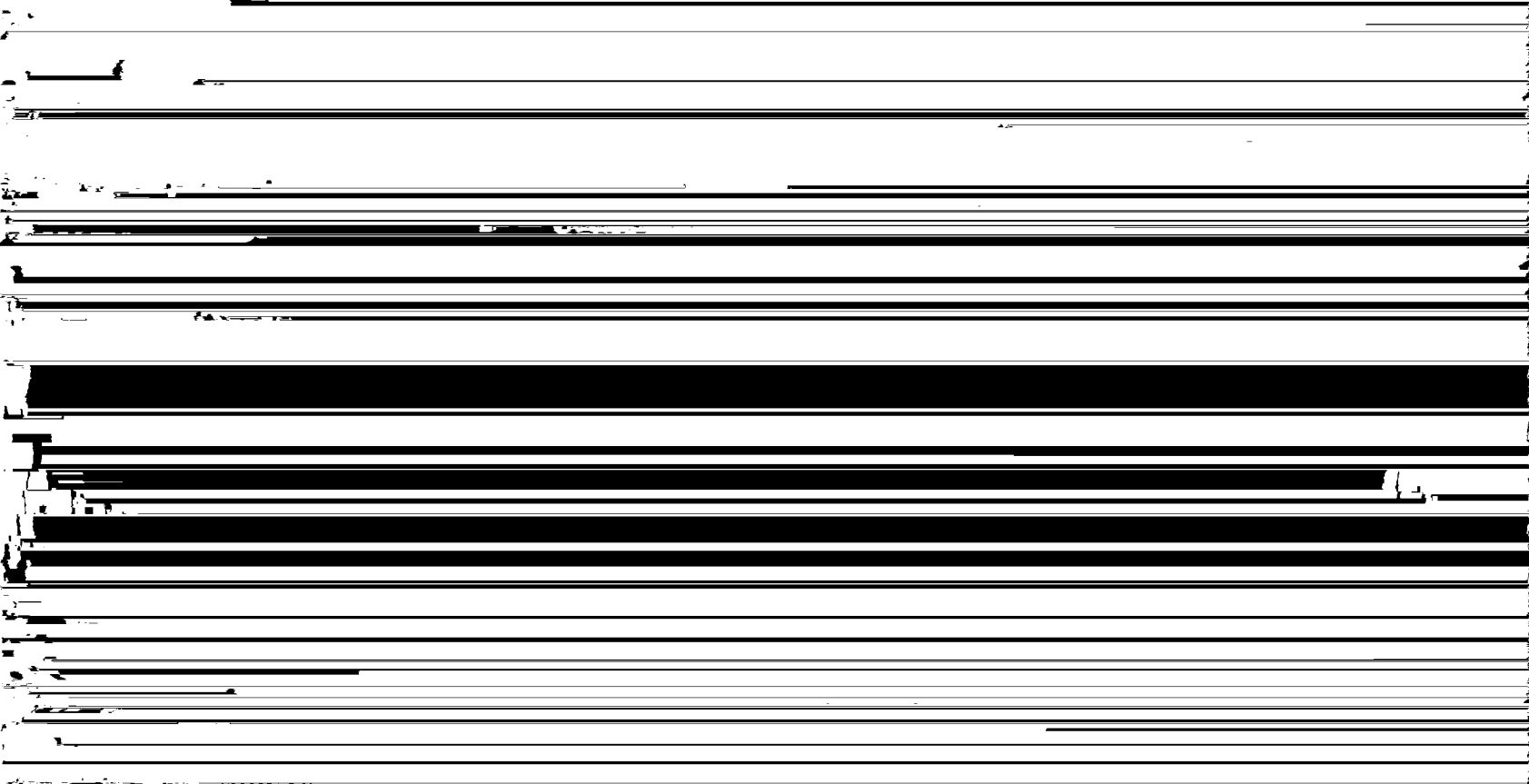
In fact, the terms cable ready and cable compatible have not appeared on the products and literature of most major brands for several years. Nonetheless, consumers continue to purchase these products and become confused and frustrated with their performance when connected to cable. This is because consumers consider it only logical that if a product tunes the cable channels, it should work on the cable channels when they subscribe to cable. It is difficult to argue with that premise. It would be absurd to think that the cable television industry could avoid the requirements of the Cable Act just by not using the word "cable" for its services. Just calling itself "wired television" would not stand as a reason for avoiding the provisions of the 1992 Cable Act. Likewise, avoiding the use of the terms "cable ready" or "cable compatible" cannot justify the sale of products which evade the intent of the legislation.

All of the specifications for "cable ready" must also apply to set-top converters sold to the public to prevent the same difficulties from occurring when subscribers purchase their own

converters.³¹ Otherwise, cheap television tuners will be sold in plastic boxes with inadequate shielding and other deficient performance factors. Subscribers will take these home and be frustrated. The converters which are sold to subscribers must include the EIA/ANSI 563 Decoder Interface Connector so that the subscriber is protected against having his investment rendered obsolete if he moves to a cable system with scrambling or if his cable system offers new services which involve scrambling. The same connector requirement is not needed for converters owned by the cable operator, since the subscriber is not at risk if that equipment is made obsolete by a cable system upgrade.

VI. NOTIFICATION AND EDUCATION

The benefits of choice are only realizable if the choice is an informed choice. Otherwise, mistakes, frustration, and confusion result. Time Warner is willing to accept the need to notifv subscribers of their choices and how these choices impact



electronics features may not be compatible with some of the services they may chose to purchase from cable companies, analogous to the notification required by cable operators pursuant to Section 624A(c)(2)(B)(i). Specifically, a label should be required on the picture tube and VCR front informing the purchaser that just because a product tunes cable channels, does not mean it will be usable with some or all of them because of tuner deficiencies or because some of the channels may be scrambled. This rule should be instituted and go into effect on all new products as soon as possible. Penalties should be provided for removal of the label before the product is sold.

The cable industry is involved with subscriber education as part of its efforts to maximize subscriber satisfaction. In many cases, the assistance provided compensates for the lack of help provided by the consumer electronics retailer, the difficulty in understanding how to use features that come with TVs and VCRs, and the poorly written manuals that often come with the products. Frequently, the consumer takes advantage of having a knowledgeable technician in his home installing or servicing cable. He asks questions about the products he purchased and can't make work. Complex features are patiently explained. It is common for the cable technician to set the VCR clock to stop it from flashing "12:00." "Programmable" remote controls are programmed. In extreme cases, the VCR is still in its box and the subscriber expects its installation and a full tutorial on the use of its features. These are not a part of providing cable

service but are frequently done on an informal basis to improve customer satisfaction. This is a service which is almost never available from the retailer.

VII. DIGITAL VIDEO

In its NOI, the Commission requested comment on the impact of digital television on consumer electronics equipment and equipment compatibility issues.³² Since digital television is still in its embryonic stage, there is very little that can be said about it at this time. It must be remembered that the digital compression approach is just one element of the total system. The other components include:

- (1) A modulation technique.
- (2) An addressability and conditional access method.
- (3) Demultiplexing means to separate the signals compressed into each 6 MHz piece of spectrum.
- (4) Time Domain Equalizer training signals.
- (5) Error detection and correction schemes.

At this point in time, too little is known about these issues to be able to understand their impact on compatibility. In addition, cable's competitors are all discussing the use of digital video compression. Included here are:

- (1) Direct Broadcast Satellite ("DBS");
- (2) Video Dial Tone;
- (3) Multi-channel, Multi-point Distribution Service ("MMDS");

³²NOI at ¶17.

- (4) Cellular Television; and
- (5) Pre-recorded media.

It will do the consumer and the consumer electronics industry little good if these other users of digital video compression aren't also compatible to the same degree. In fact, any added costs to cable must be imposed in a manner that does not disadvantage cable relative to its competitors. There are industry committees working on decoder interface adapters for advanced television. Their progress will help in this effort. It seems likely that some sort of interface to an external

~~decoder and decompressor will be provided. The details remain~~

ago had only 30,000 transistors. Today's units (Intel 80486) have 1.2 million transistors. The point of all this is simply that we are just at the beginning of the evolution of digital video and digital video compression. We cannot predict or understand enough about it to create standards now that would not prevent taking advantage of its likely dramatic progress.

Section 624A(d) of the 1992 Cable Act requires the Commission to "review regulations to reflect improvements and changes"

It would be prudent to review the impact of digital video when more is known and understood about that technology.

VIII. CONCLUSION

In balancing the desire to ensure greater compatibility of consumer electronics equipment and cable television systems against the need of the cable industry to protect against signal theft, the FCC should not make any recommendations to Congress or adopt any regulations which would prevent, or in any way appreciably restrict, a cable operator's right to utilize signal scrambling for the purposes of providing tier or program security. Scrambling is the only proven and dependable technology which has been demonstrated to be cost effective and flexible enough to accommodate future on-demand services, advanced network architectures and the new regulatory requirements imposed by the 1992 Cable Act pertaining to must-carry/retransmission consent, channel positioning and anti buy-through. Undue restrictions on scrambling would destroy the diversity of service, technology and choice which the 1984 and

1992 Cable Acts seek to foster and would increase costs to cable subscribers.

In order to avoid undermining the effectiveness of scrambling as the signal security technology of choice, the Commission must avoid pressures to adopt a national scrambling standard that would provide additional incentives for signal piracy and divert substantial capital expenditures from the deployment of newly developing technologies and services. Similarly, while the 1992 Cable Act directs the Commission to encourage the commercial availability of remote controls and converters, nothing in the statute requires that descramblers or encryption equipment be made available commercially. The Commission should refrain from interpreting its statute in a manner that would require descrambling of equipment be made available for sale to the public since any such action would severely undermine the continuing effectiveness of scrambling as a viable signal security technique.

The Commission's equipment compatibility inquiry should not primarily focus on scrambling. Proven technology exists and is available in the marketplace today to overcome the three specific incompatibility issues which the statute seeks to resolve. Picture-in-picture, the availability to simultaneously watch and record different channels, and the ability to record consecutive programs appearing on different channels can all be accomplished in a number of different ways by the consumer at very modest cost.

The real problem is one of consumer awareness. The FCC should use this opportunity to require both the cable and consumer electronics industries to make their customers aware of the potential problems and available means of resolving those problems at the time the consumer electronics equipment is purchased and at the time cable subscribership commences. Both industries should work together to develop a standardized format of notice to be given to cable subscribers and purchasers of consumer electronics equipment apprising them of the potential limitations of the equipment when used on the local cable system and the ways in which these limitations may be overcome. Such notifications would include information on the use of decoder bypass switches, descramblers with built-in timers, remote controls with built-in times, VCR-Plus type devices, and multiple descramblers.

In addition to notification requirements, the FCC must adopt specific standards which consumer electronics equipment must meet in order to be considered "cable ready" or "cable compatible."

~~Subject: Cable Ready Equipment - FCC (1987-1988)~~

for switch isolation; and a requirement that the tuner contained in all cable ready equipment be replaceable to allow for advances in cable technology. Finally, in order to avoid any possibility of subscriber confusion arising from the purchase of equipment which is not marketed as cable ready, the FCC should adopt a requirement that any equipment which does not conform to cable ready standards should not be allowed to tune to any frequencies other than those allocated for over-the-air broadcasting. This will ensure that the FCC's standards are not evaded merely by equipment manufacturers refraining from using the term "cable ready" when marketing their products.

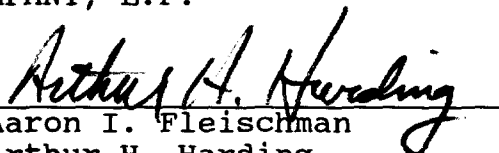
Adoption of the suggestions contained in these comments will allow the FCC to meet the compatibility goals established by Congress at minimal cost to the consumer, the cable industry and the consumer electronics industries. It will also allow for equipment compatibility goals to be achieved without sacrificing signal security and encouraging theft of service which costs the

cable industry (and ultimately subscribers, local regulators and the public) nearly five billion dollars a year.

Respectfully submitted,

TIME WARNER ENTERTAINMENT
COMPANY, L.P.

By:


Aaron I. Fleischman
Arthur H. Harding
Howard S. Shapiro

Its Attorneys

Fleischman and Walsh
1400 Sixteenth Street, N.W.
Sixth Floor
Washington, D.C. 20036
(202) 939-7900

APPENDIX 1

ANSWERS TO SPECIFIC NOI QUESTIONS

Appendix: Answers to Specific NOI Questions

12.1 What technologies and technical systems do cable systems currently use to provide service to subscribers premises?

Cable systems use a wide variety of technologies to provide services to subscribers. This is due to the rapid advance of technology over the last decade. Depending on when a cable system was built (or upgraded) different approaches are used.

In essentially all cases in use today, the programming is provided in analog form to the subscribers' premises via coaxial cable. The cable system can be divided into three major portions, the drop, the feeder, and the trunk. The drop is the flexible coaxial cable which brings the signal into the home. It is typically 100 to 200 feet long. The feeder cable is usually solid aluminum cable hung on poles or buried underground in the neighborhood. The feeder is tapped so that signals can be split off and delivered to the home. The splitting of signals results in the need to restrict feeder cable to short runs of cable and the need for amplification. Generally, signal levels are higher on the feeder portion of the plant since tapping

Most systems being upgraded today target 550 MHz. A common technique is to build "GHz Ready" systems where the amplifier spacing is for 1 GHz even though 550 MHz amplifiers are installed. Passive devices such as taps and splitters are rated at a GHz. When GHz amplifiers become more economical, these systems will be upgraded to their full GHz capacity.

12.2.b *In what circumstance and to what extent are dual cables used to deliver service?*

Exact data is not available. However it is believed that dual cable systems service less than 5 % of cable subscribers. No new dual cable systems are being built by Time Warner. The motivation for dual cable was to provide high channel capacity at a time when high bandwidth was not yet feasible. In the early 1980's, city franchise authorities demanded such high capacities. Today, the use of fiber and GHz bandwidth amplifiers makes dual cable unnecessary. Digital Video Compression also promises such high capacity that dual cable is unlikely to be needed in the future.

12.3.a *What methods and technologies do cable systems use to prevent theft and unauthorized reception of service (the various scrambling and encryption systems converter and / or descrambler units, interfering carrier systems, channel-blocking traps, addressable systems, interdiction systems, etc)?*

The fundamental method of access control is the connection of the drop cable. When all subscription ceases, it is disconnected. This must be monitored since members of the public sometimes make their own illegal connections - even using their own wire.

Higher levels of service such as Premium Channels, Impulse Pay Per View, and higher tiers of service are controlled by traps or scrambling and to a trivial extent by interdiction.

High penetration Premium services which are taken by more than half of the subscribers are protected with negative traps which are installed outside the homes of subscribers who do not take the service. Positive traps are used for services of lower penetrations. Positive traps remove an interfering carrier at the home. That carrier is inserted at the cable headend.

Scrambling is used for the bulk of the remaining applications. Addressable descramblers allow electronic control of access. The scrambling process impairs or destroys the viewing quality of the signal for those who do not have descramblers. Modern scrambling systems make theft of service difficult, provide good hiding of the video from those who should not see it, and yield quality picture to legitimate subscribers.

In most current cable systems, a hybrid approach is used. High penetration, stable Premium Service subscriptions are negative trapped. One or two lower penetration Premium services may be positive trapped. Pay per view and other premium services are scrambled. The public's interest in multi-channel pay per view and many of the providers of the Cable Act tend to drive scrambling to higher penetrations.

provided by a combination of operation as assembling and addressability.

allow simultaneous descrambling, seriously reduce the security of the signal protection. This is an

2) Direct Pick Up interference, 3) overloading when presented with a full spectrum, 4) inadequate selectivity allowing adjacent channel signals to mix with the desired signal and degrade it, 5) poor image response so that a channel at the image frequency interferes with the desired signal, 6) signal leakage from the product at aircraft navigation or communication frequencies or emergency service frequencies, or 7) back feed of interfering signals which impair the reception on other TV's or VCR's.

No Time Warner cable system uses converters for signal security. Cable systems use converters to compensate for tuner deficiencies.

The exact number of converters in use is not known with precision. It is estimated that ten to fifteen million converters are used in cable homes to compensate for tuner deficiencies.

Converters must be distinguished from descramblers, which are utilized for signal security purposes to restore an encrypted signal to a viewable state. While converters and descramblers are often placed in the same housing for convenience sake, they are two distinct and very different pieces of equipment which perform entirely different functions.

12.5 *What are the cost of the existing alternative techniques for preventing theft, unauthorized reception and addressing technical performance considerations, both to cable systems and subscribers?*

There are a wide variety of factors which impact the cost of signal security techniques. Costs include fixed costs which are independent of the number of subscribers and variable costs which increase with the number of subscribers. Some security systems are "supply security" in that cost is incurred when enabling a subscriber to have access to signals. Other security systems are "denial security" where money must be spent to prevent access to signals. The latter only makes sense when the majority of subscribers take a service and only a few must be prevented from having access.

Negative traps are relatively inexpensive devices costing \$8 to \$15 per channel. However, the labor costs of installation, removal and monitoring are substantial. Each time a subscriber wishes to change service protected by a trap, a truck roll is required. A regular program of monitoring is necessary since subscribers remove traps or pay others to remove them. This results in theft of service which must be detected and corrected. Similar comments apply to positive traps except that detection of illegal device is much more difficult since they are in the home.

The cost of a truck roll depends on the cost of the truck, its maintenance, insurance, licensing, the cost of labor in the cable system and other variables such as the likelihood of finding the subscriber at home. In places like Manhattan, the costs are much higher than in a suburb or a small town. Truck roll costs vary from \$15 to \$50 depending on geography.

Scrambling is a "supply security" with fixed costs of two to three thousand dollars per scrambled channel and about ten thousand dollars for a control computer. Incremental costs are about \$110 per subscriber for the in-home hardware. Installation costs include a truck roll if scrambling is added after installation. An important characteristic of scrambling is that costs are incurred only when revenue is generated. This avoids costs which would have to be shared by those who don't want the service. Another important characteristic of scrambling is that its variable costs are not channel incremental. A descrambler can descramble an arbitrary number of channels up to the limit of the tuning capacity of its tuner.

Interdiction is a "denial security" where costs are incurred to prevent access to signals. Interdiction is channel incremental. The more channels to be protected, the more hardware is required. If the cable system wishes to expand capacity beyond what the interdiction system was designed for, a complete replacement may be necessary. Current product does not support the maximum number of channels built into cable systems. The per subscriber capital costs of Interdiction are approximately double that of

scrambling. Unfortunately, all subscribers must have Interdiction units outside their residence unless they take all services offered. Because cable strives to offer a wide variety of choice, almost no one takes all available services. Thus the up front capital costs for an Interdiction approach are horrendous. From an operational cost standpoint, Interdiction hardware doubles the powering required in a cable system. Current implementations of Interdiction require careful calibration and balancing, increasing maintenance costs.

Costs are not available for Broadband Descrambling approaches because they are experimental. This technique has not been subjected to the discipline of the factory floor and the market place and so cost estimates must be taken with a grain of salt. This is especially the case when they are made by proponents with little or no manufacturing experience who have not had to manufacture the devices. It is likely that Broadband Descrambling will have costs similar to Interdiction. Like Interdiction, Broadband Descrambling is channel incremental because as more channels must be controlled, more electronics is required. Also, the hardware requires powering from the cable plant.

12.6.a *What is the effect of channelization practices and security systems on the operation of extended features of television receivers, video cassette recorders and other related consumer television equipment?*

The channelization of cable systems is governed by the maximum bandwidth that current technology allows and the need to comply with regulations on channel off-sets to prevent interference with aircraft navigation and communication.

Slight non-linearities in cable systems cause the carriers of video signals to mix and produce interference components. It has been determined that some channelization plans place these interference components in places which minimize the impact on picture quality. This has been the motivation of Harmonically Related Carrier, HRC, and Integrally Related Carrier, IRC, channel plans. These techniques made channel expansion possible prior to the development of more linear amplifiers. At present, these techniques are not considered necessary in new construction or upgrades which replace amplifiers. Probably less than 15 % of cable systems use these channelization plans. These channelization plans are likely to gradually fade away as these systems are rebuilt. They cannot be eliminated until then without a significant degradation in picture quality in systems designed around them. However, nearly all cable systems have frequency off-sets to comply with regulations relative to aircraft bands. The impact of this on TV's and VCR's is on the tuner only. A well designed, computer controlled tuner has no problem with these frequency plans. Earlier versions of tuners required a switch to be placed in the correct position. New tuners usually only require an indication of whether they are connected to cable or an antenna. Some models are fully automatic. Channelization has no impact on any of the extended features of TV's or VCR's.

Significant to cable systems capable of receiving broadcast, public, educational, or governmental

dual unit because of the low demand for such products. All manufacturers are planning to offer these dual units if demand for them can be demonstrated. No technical developments are required, just tooling and packaging.

Subscribers who wish to record different channels consecutively have several options. They may request a set-top decoder which has a timer built in. They then use the same skills needed to program their VCR to also program the set-top descrambler. As an alternative, "Universal" remote controls are available on the after market for use with converters which include timers. A popular development just a few years old is the "VCR Plus" product. It looks like a remote control but is really a timer / controller. It is initialized with the correct time and date and the channelization plan of the cable system. The subscriber enters strings of numbers which are obtained from a printed program guide. The numbers are coded to tell the device when to emit control signals which turn on the VCR and change the channels of the set-top decoder. Consecutive recording of different channels becomes easy.

Subscribers who have an RCA, Quasar, or Bang & Olufsen TV or Bang & Olufsen VCR which includes the ANSI / EIA 563 Decoder Interface Connector can request a component descrambler from their cable company. Zenith and Jerrold have made such units available.

12.6.b *How does use of these techniques affect the technical performance and operations of cable systems?*

Cable systems take care that the scrambling systems adequately hide video from those who might be offended by it and yield high quality pictures to those who wish to subscribe.

Cable operators monitor subscribers to insure that cheating does not become a problem since this is unfair to legitimate subscribers, franchise authorities, programers, artists whose copyrights are violated, and stockholders.

The offering of choice to subscribers is fundamental to the business of cable television. The management and operation of scrambling and addressability systems is part of doing that business and serving subscribers with programming choices they desire.

12.7 *Which methods of scrambling and encryption systems do not interfere with the functions of subscribers' TV receivers, VCRs and other TV equipment?*

The majority of methods of scrambling made by Zenith and Jerrold are available in ANSI / EIA 563 versions which make scrambling transparent to TV's and VCR's which incorporate the ANSI / EIA 563 Decoder Interface Connector.

All vendors make set-top units with built in timers which allow for consecutive recording of different channels. Additionally, "Universal" remote controls and the VCR Plus product accommodate all of the control codes for all descramblers currently in use.

Jerrold makes the "Watch and Record" brand dual descrambler which makes watching one scrambled channel while recording a different scrambled channel easy. Other manufactures are considering such products. In all cases, two descramblers can be made available to subscribers.

In summary, all methods of scrambling and encryption systems can be implemented in a manner which

is beyond the capacity or motivation of consumers to master. In almost all cases, the complexity of the TV's and VCR's themselves are the limiting factors. The subscriber who has the skills to operate these products has little difficulty operating supplementary cable equipment.

12.8 *What types of cable converters are currently available to cable subscribers commercially from third parties?*

Cable converters are frequency changing devices which are meant to compensate for deficiencies of the tuners of TV's or VCR's. These deficiencies include lack of tuning range, Direct Pick Up problems, or other technical deficiencies. Cable subscribers can purchase cable converters from a variety of sources. Many electronics catalogs sell them and they are available from mail order sources. The cable company's